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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/807,737	02/27/97	OHTANI	H 0756-1638

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MM31/0831

EXAMINER
SULSKY MARTIN

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 08/31/98

Please find below and/or attached an Office communication concerning this application or
proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
08/807,737

Applicant(s)
Ohtani et al.

Examiner
Martin Sulsky

Group Art Unit
2813



☒ Responsive to communication(s) filed on Feb 27, 1997

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 19-33 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 19-33 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☒ received in Application No. (Series Code/Serial Number) 08/391,580.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 19-28 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Zhang (US '937).

Zhang discloses depositing amorphous silicon on an insulating layer (col 7, lines 47-50), disposing a catalyst in contact with said amorphous silicon (col 7, lines 43-45), heating to crystallize the semiconductor film (col 7, lines 52-55), annealing said semiconductor film with a halogen lamp generating infrared light of wave length 0.5 to 4 μm (col 7, lines 64-68, col 8, lines 1-3), wherein said annealing is carried out in such a manner that a temperature of a monitored single crystal silicon wafer is raised at a rate of 50 to 200°C/s and then cooled at a rate of 20 to 100°C/s (col 8 lines, 9-11). The catalyst metal may be one of Ni, Pd, Pt, Cu, Ag, Au, In, Sn, P, As, Sb (col 5, lines 65-68, col 6, lines 1-5).

3. Claims 19-21,23-26,28 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Zhang (US '772).

Zhang discloses depositing amorphous silicon on an insulating layer (col 12, lines 15-17), disposing a catalyst in contact with said amorphous silicon (col 11, lines 60-68), heating to

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crystallize the semiconductor film (col 12, lines 18-20), annealing said semiconductor film with a halogen lamp generating infrared light (col 13, lines 50-52), wherein said annealing is carried out in such a manner that a temperature of a monitored single crystal silicon wafer is raised at a rate of 50 to 200°C/s and then cooled at a rate of 20 to 100°C/s . The catalyst metal may be one of Ni, Pd, Pt, Cu, Ag, Au, In, Sn, P, As, Sb (col 6, lines 35-36). It is held, absent evidence to the contrary, that heating rate of a halogen flash lamp is 50 to 200°C/s and that natural cooling is at a rate of 20 to 100°C/s. See In re Best, 195 USPQ 428 (CCPA 1977) and In re Swinhart, 169 USPQ 226,229 (CCPA 1971) (where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that subject matter shown to be in the prior art does not possess the characteristics relied on) and In re Fitzgerald, 205 USPQ 594 (CCPA 1980) (the burden of proof can be shifted to the applicant to show that subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 USC 102 or obviousness under 35 USC 103).

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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5. Claims 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang (US '121) in view of Zhang (US '937).

Reference '121 teaches depositing amorphous silicon on an insulating layer (col 11, lines 15-20), disposing a catalyst in contact with said amorphous silicon (col 11, lines 28-30), heating to crystallize the semiconductor film (col 11, lines 50-55) and annealing said semiconductor film with laser light (col 13, lines 50-52). However, the reference does not teach annealing with a halogen lamp.

Zhang (US '937) teaches that annealing to promote crystallization can be achieved with visible or near infrared light (col 8, lines 2-3). The wave length of the optical laser used in reference '121 is 0.308 μm while the wave lengths used in Zhang '937 range from 0.6-4 μm . To substitute the optical laser of Zhang '937 for the halogen lamp of Zhang '121 for the purpose of annealing the silicon layer would have been obvious to one skilled in the art at the time the invention was made to achieve a specific result as described in a reference. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result

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effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the halogen lamp of Zhang '937 to anneal the silicon layers of Zhang '121 because they are art recognized equivalent as taught by Zhang '937.

6. Claims 29-33 rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang (US '772) as applied to claims 19-21, 23-26, 28 above, and further in view of Hultman (J. Appl. Phys.).

Zhang teaches all of the limitations in the claims above as well as using silicon nitride as the insulating layer (col 7, lines 30-34). However, the reference does not teach crystallizing amorphous silicon in a non (111) orientation.

Hultman teaches that annealing catalyst doped amorphous silicon deposited on silicon nitride results in random nucleation (page 3648, lines 32-34). Diffraction data includes (111), (200), (220), and (311) peaks (Table I).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to crystallize the amorphous silicon film of Zhang in a non (111) direction because Hultman teaches that annealing catalyst doped amorphous silicon deposited on silicon nitride results in random nucleation.

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Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321© may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 19-33 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of U.S. Patent No. 5605846. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1-26 contain all of the limitations of claims 19-33 except the heat up rate, the cooling rate, the range of wave length of the halogen lamp and the crystallizing in a non (111) orientation. However, motivation to add said details is in patent number 5,605,846 at (col 2, lines 26-36, col 8, lines 65-68, col 9, lines 12-14).

Conclusion

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9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

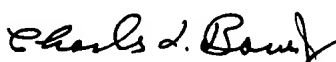
US 5,352,291 Zhang et al. Teaches heating amorphous silicon to crystallize and laser annealing.

US 5,426,064 Zhang et al. Teaches depositing catalyst and heating to crystallize amorphous silicon. Includes laser annealing.

Any inquiry concerning this communication from the examiner should be directed to Martin Sulsky whose telephone number is (703) 305-0129. The examiner can normally be reached by telephone on Monday to Friday 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Bowers, can be reached on (703) 308-2417. The fax phone number for the group is (703) 305-3432.

MS


Charles Bowers
Supervisory Patent Examiner
Technology Center 2800

August 27, 1998